

PEER REVIEW REPORT

Endangered Species Act Status Review Report for the Humphead Wrasse, *Cheilinus undulatus*

Peer Reviewers:

- Pat Colin, Ph.D., Coral Reef Research Foundation, Palau
- Yvonne Sadovy, Ph.D., University of Hong Kong, Hong Kong, China
- Brian Zgliczynski, Ph.D., Scripps Institute of Oceanography, La Jolla, CA

Peer Review Directive:

Reviewers are requested to comment on factual errors or omissions in the biological or threats descriptions, if any, and whether the agency has presented sufficient and accurate information relevant to the extinction risk analysis of the humphead wrasse.

Peer Reviewer Comments (*not associated with order of names as they appear above*):

Reviewer 1

General Comments to the Extinction Risk Analysis Team:

Overall, I feel that the Extinction Risk Analysis Team should be commended for their efforts. I recognize that this report required a significant amount of time and effort. I feel that the Status Review Report for the humphead wrasse is complete and meets the requirements as outlined by NMFS and the ESA. All of the components and information required to make a thorough status review are contained within this document and I do not recommend that significant revisions be made. However, I feel that this report can be strengthened and have provided a few general comments below that should be addressed prior to the report being finalized. Additionally, I have provided numerous edits and comments throughout the document using track changes that I hope you will find useful.

1) **Executive Summary.** As currently written the Executive Summary, although concise, should be edited to reflect the key points of the report similar to a scientific abstract (keeping in mind that this report is divided into 2 parts). The first paragraph (Lines 86-101) is concise and to the point however, the 2nd through 4th paragraphs provide too much detail and should be edited/distilled to provide the most relevant information pertaining to humphead wrasse. A simple and concise summary of the ecology and fisheries exploitation for humphead wrasse can be stated in the text without providing too many statistics and citations. The remaining paragraphs of the executive summary should distil the key information and results from the 2nd part of the review. I recommend providing a brief summary of the methods used to assess extinction risk and the key results of the assessment. Much of the language can be taken directly from the document but the end result should provide the reader with a concise

summary of the information contained within the document. I recommend re-structuring the Executive Summary to address the following questions:

- a. What is the purpose and goal of this review;
- b. What is the species under review and what are the important ecological characteristics;
- c. What are the threats to this species;
- d. How was the extinction risk analysis completed; and
- e. What are key findings, recommendations, and conclusions made by the team (This is the most important and should be made very clear, perhaps even bulletized).

2) **Single voice used throughout document.** I realize that this report represents a combined effort with all members of the ERA Team contributing to the various sections. However, this review will be greatly improved if efforts are made to edit the text so that it reads using a single voice. As written, it is clear that multiple individuals drafted Parts I and II (a different voice and flow for each part). In my professional opinion Part II is written much more concisely and to the point and this style of writing should be used for Part I.

3) **Part I:** The biological assessment and identification of threats. The goal of this section is to synthesize and distill the best available information pertaining to the status and threats facing the humphead wrasse. While Part I provides a thorough review of the status and threats facing humphead wrasse much of the text can be distilled and/or summarized and made more concise. I provided edits directly to the document and comments were applied to specific paragraphs requiring revision. However, I recommend that the ERA Team take the time to read through the document and delete unnecessary text. In doing so, this will most likely address item 2) above.

Reviewer 2

In general, it is a good start but work is still needed and some updating required. I have included detailed comments throughout to assist a revision. In some places, references are needed (as indicated) to support statements needed.

I mention that Dr. Mike Dawson has done a genetic study of the species for population structure, which I understand has been completed. If this is still relevant, I can provide you with his contact details.

In terms of the outcome of the review, overall, I agree with the assessment that overutilization (esp. commercial use, mariculture use, IUU) and serious inadequacy of existing enforcement/compliance, despite many regulations on paper, as being important.

In addition, however, I would also consider demographic factors to be more important, based on available and presented information, than was evidently considered by the team. For example, longevity, low natural abundance and high demand, considerable doubt about abundance data (and lack of methods provided in most cases enabling it to be meaningfully assessed) centre of HHW geographic distribution spanning core habitat but being most heavily targeted (i.e., coral triangle), marked declines in response to fishing and expected continued market demand, little evidence of recovery despite regulations, and long generation length (the

estimate of generation length is too low in the review-see comments in the relevant section). Moreover, very few adults are noted overall and the great majority of fish noted are juveniles, small adults.

Therefore, this reviewer would put this species at a somewhat higher level of extinction risk in the moderate time frame than indicated here-all things considered. In general, it appears that the focus and approach taken are not precautionary. I do not know if this is the usual ESA approach but the way the review is written and data considered errs on the non-precautionary side.

Reviewer 3

Part I. Biological assessment and identification of threats

I am uncertain what sort of editing standard should be applied to a document of this type. I have generally reviewed for content as though it was a journal article, but have not edited all text to that standard. I found some of the writing problematic and some of the interpretation of information in the literature incorrect or misleading. I found the section on "Analysis of ESA section factors" particularly uninformative. Most of that section appeared to be "boilerplate" about 'this and that' possible threat. None of it seemed to apply directly to the situation that might exist in US areas where the fish is present, or at least there was no attempt to link that list of usual suspect threats with what actually is going on in the US areas where the fish occurs.

Perhaps this is being a bit overcritical, but after reading through the first sections of the document, where many errors and omissions were found, I was hoping for better. There were a number of omissions of important materials about HHW and I list some of these below. Some are relatively new publications, but others are not.

I have made many specific comments on Part 1. I don't know how long ago this draft was written, but I have provided some recent information and publications that should be included in a revision. There also appears to be a tendency to just accept what is written as fact, without looking into the supporting data or information. Some of the cited publications have been only superficially described or discussed. I would think a careful examination of the work of Yvonne Sadovy over many years in Indonesia would provide a wealth of insight and improve the quality of the biological review. There is great need for improved fishery independent sampling methods for larger reef fishes and more cross calibrations and evaluation for the methods that are presently being used. The 18 fold difference in density measurement between towed dive and belt transects for HHW in US areas should be cause for alarm, because if this is the level of accuracy and precision in data, what do we really know about these fish(es)?

There are a number of publications and reports that have not been cited or mined for information that would useful to include are:

- FAO Fisheries Report No. 748 (2004).
- Sadovy and Colin 2013. Spawning aggregation book, Springer.
- Friedlander and Koike 2013. report

- Polloi et al. 2014. report.
- PCS report, Colin 2010.
- Ondine et al. 2010. FAO publication
- Richard et al. 2011. Journal article
- Randall 1979. Journal article

Additional information that should be included:

In Palau there are a number of recent surveys of HHW populations that have not been examined in this draft document. Friedlander and Koike (2013) estimated HHW populations in Palau through transects in various habitats, but their specific methods are not described. They also provided estimated numbers of fish present in all habitats, again without indicating how they determined fish numbers or habitat areas of various types. They did report densities of 0.89-1.05 HHW per hectare (10,000 sq. m). They did not include a sea grass environment in their surveys. Polloi et al. (2014) prepared a short summary based on this data, which again does not specify the methods used. Both studies report steeply declining catches of HHW, however, the reef fishery reporting by the Palau Bureau of Marine Resources has been increasingly poor for the last several years, that the data could be an artifact of the monitoring problems and should be considered unrepresentative. Basically nothing of the status of the species in Palau can be determined from landings data. Polloi et al (2014) also provided a diver "willingness to pay to see HHW" survey report for Palau.

Colin (2010) reported, based on data collected by the Palau Conservation Society (PCS) from two sets of surveys (2006 and duplicated in 2008) using the same methods as were used in the Indonesian IUCN surveys, a value for outer reef slope densities of HHW of about 2.0 fish per hectare was measured. There was essentially no change in density values between 2006 and 2008 for the repeated lengthy transects. The Colin (2010) report is not available on line, despite most PCS reports normally being posted on their web site. The density value reported from the PCS data is roughly twice that from Friedlander and Koike (2013). Is this the result of changes in the fish populations or a difference in values obtained by different methods? This is indicative of the difficulty in assessing populations of reef fishes such as HHW.

Oddone et al. (2010) estimated habitats suitable for HHW based on remote sensing in areas of Indonesia, Malaysia and Papua New Guinea through a method developed for this specific purpose. They found previous surveys to have overestimated suitable habitat for HHW from this region. They also reported that even if densities within specific habitats could be accurately determined, identifying the amount of various habitats within a given geographic area is tricky.

A case history on HHW (Colin and Sadovy de Mitcheson 2012:478-487) in the volume by Sadovy de Mitcheson & Colin (2012. Reef Fish Spawning Aggregations: Biology, Research and Management, Springer Fish and Fisheries series 35) has a summary of information on HHW and its spawning biology.

Richard et al. (2011, Bulletin Marine Sci 87(1):55). which is not cited in the draft document, compared towed diver and belt transect surveys in the Marianas Island for HHW (among other species) and found a sixteen fold difference in belt versus towed diver surveys. They also

commented that belt transect encounter rates in the Marianas were so low as to make reliable assessments using such surveys unfeasible.

Randall (1979) reported one large HHW from Enewetak, Marshall Islands, produced a reaction consistent with moderate ciguatera poisoning, while 6 others, smaller in size, did not. Randall, JE 1979. Fishery Bulletin 78(2):237.

Text sent by Michael N Dawson, UC Merced (mdawson@ucmerced.edu) regarding HHW genetics and phylogeography.

"Molecular markers have been developed for phylogeographic and population genetic analyses of *C. undulatus*. These include mitochondrial control region, cytochrome b, and 16S ribosomal DNA, and twelve microsatellite loci that show few null alleles and modest heterozygosity (range 5-12 alleles per locus; mean 11). Together these markers should be able to resolve oceanic-scale and within-archipelago differentiation, if such exists, with sufficient sample sizes and geographic coverage. Analysis of ca. 200 fishes spanning from the eastern Indian Ocean to Pohnpei, and from the Great Barrier Reef to Marianas islands is currently underway, with laboratory analyses complete, computational analyses in progress, and a manuscript in the early stages of preparation. Preliminary analyses of mitochondrial DNA from a subset of samples from across this range suggested no deep genetic differentiation on the scale of ocean basins. Robust conclusions await final analyses of the complete dataset."

Part II. Assessment of Extinction Risk.

This section is straightforward and I have no disagreements with the arguments and logic applied to the assessment. There are a few minor comments I have added, but basically there is little more I can provide on it.